REMARKS

Claims 1-23 are pending in the present application, with claims 11-23 withdrawn. With entry of this Amendment, Applicants amend claims 1 and 8, cancel claims 11-23 without prejudice and add new claims 24-26. Reexamination and reconsideration are respectfully requested.

The present invention is directed to a substrate processing apparatus having a plurality of chambers and an ozone generator. Substrates are processed in the chambers with ozone-containing gas generated by the ozone-generator. The apparatus determines demand for ozone-containing gas based on the number of processing chambers processing with the ozone-containing gas. The apparatus then regulates the flow rate of *oxygen*-containing gas to the ozone generator so that the flow rate of the *ozone*-containing gas being discharged from the ozone generator substantially corresponds to the demand. In this manner, the apparatus tracks ozone generation to what is needed for processing.

Applicants have amended claim 1 to recite: "a controller configured to determine demand for the ozone-containing gas based on a number of processing chambers processing with the ozone-containing gas, and configured to control the flow regulator to regulate a flow rate of the oxygen-containing gas being supplied to the ozone generator so that a flow rate of the ozone-containing gas being discharged from the ozone generator to be supplied to the processing chamber or chambers substantially corresponds to the ozone-containing gas demand."

It is believed that support for this amendment is found throughout the specification including (without limitation) at page 22, lines 2-11 and Figure 5.

Applicants have amended dependent claim 8 to correct a minor informality and have added three new claims (claims 24-26) depending from claim 1.

Each of the rejections is addressed below.

US 2003/0170949A1 (based on § 102(e))

The Examiner rejected claims 1-5 and 7-10 under 35 U.S.C. § 102(e) as being anticipated by the published '949 application. The rejection is respectfully traversed.

As the Examiner has cited, Figures 3, 14, 15 and 16 all disclose an ozone generator 42 connected to a supply selector. Figure 5 illustrates in detail the ozone generator. As explained in paragraph 0067, ozone is generated by passing oxygen through the gap between the electrodes 42b and 42c. The electrodes are connected by circuit to a high frequency power source. The system controls a switch 42e to generate ozone by completing the circuit.

There is nothing in the cited figures or paragraph 0067 that discloses a "flow regulator adapted to regulate a flow rate of the oxygen containing gas supplied to the ozone generator" as recited in claim 1. As Figure 5 illustrates, oxygen is supplied to the generator without any type of flow regulator between the oxygen source and the ozone generator. Thus, the published '949 application does not anticipate claim 1 and any of its dependent claims.

The absence of the recited flow regulator highlights another important difference between the published '949 application and the claimed invention. As discussed above, the present invention has a controller that controls the supply of oxygen containing gas to the ozone generator so that the ozone generator generates a flow rate of ozone-containing gas based on demand. The fact that the published '949 application does not disclose any flow regulator regulating the flow of oxygen to the ozone generator necessarily forecloses the recited control performed by the controller in claim 1. That is, the published '949 application fails to disclose: "a controller configured to determine demand for the ozone-containing gas based on a number of processing chambers processing with the ozone-containing gas, and configured to control the flow regulator to regulate a flow rate of the oxygen-containing gas being supplied to the ozone generator so that a flow rate of the ozone-containing gas being discharged from the ozone generator to be supplied to the processing chamber or chambers substantially corresponds to the ozone-containing gas demand." Accordingly, Applicants respectfully submit that claim and its dependent claims are not anticipated by the published '949 application for this reason as well.

Applicants note that the rejection based on the published '949 application may be overcome in other ways as set forth in the Office Action. While Applicants reserve their right to overcome the rejection in one or more of these ways, it is believed that the distinctions between the published '949 application and the claimed invention as discussed above are sufficient to overcome the rejection.

US 2003/0170949A1 (based on double patenting)

The Examiner further provisionally rejected claims 1-10 under the doctrine of obviousness-type double patenting over claims 1-19 of the '949 application. The rejection is respectfully traversed.

As a preliminary matter, Applicants note that the published '949 application is currently pending in the USPTO with serial no. 10/384,089. The Examiner examining the application is Ramesh Krishnamurthy in art unit 3753.

Claims 1-19 do not recite a flow regulator that regulates the flow rate of the oxygen-containing gas supplied to the ozone generator. As a result, the claims also fail to disclose the recited controller that is configured to control the flow regulator. These recitations are not minor details. As discussed above, the object of the invention is to track ozone generation to demand, and the claimed invention achieves this object through these recitations. Nor has the Examiner provided any detailed explanation on how these recitations are obvious variations of claims 1-19. Accordingly, Applicants respectfully submit claim 1 and its dependent claims are patentable over the cited claims 1-19.

Applicants note that the double patenting rejection may be overcome through a terminal disclaimer as set forth in the Office Action. While Applicants reserve their right to overcome the rejection in this way, it is believed that the distinctions between claims 1-19 and the claimed invention as discussed above are sufficient to overcome the rejection.

US 2003/0133854A1 (Tabata)

The Examiner rejected claims 1-4 and 10 under 35 U.S.C. § 102(e) as being anticipated by the published '854 application (Tabata). The rejection is respectfully traversed.

The Examiner has cited Figures 2, 3 and 9-12. All of these figures disclose an ozone generator 31 that receives oxygen through a mass flow rate controller 13 and is connected to a processing chamber or chambers.

Tabata recognizes at paragraph 0014 that an ozone generator connected to a processing chamber may not maintain a proper pressure, thereby adversely effecting the ozone gas generation rate. To "stably" generate ozone gas as explained in paragraph 0062, Tabara discloses the use of a gas discharge pipe 8 with an APC 81 (see, e.g., Fig. 2) and/or a buffer tank 91 (see, e.g., Fig. 9). Tabata explains in Paragraph 0059 that even when the flow rate to the processing chamber is controlled by a mass flow controller, "the effect thereof can be eliminated by controlling the APC 81 in the gas discharge pipe 8 decreasing the effect upon the pressure in the ozone generator." Similarly, in paragraph 0095, Tabata explains that the buffer tank 91 is "capable of maintaining ozone in amount sufficient to cope with a change in the flow rate caused by the MFC 41 . . . ."

It is believed that these paragraphs indicate that the ozone gas generating rate of the ozone generator is kept essentially constant regardless of the conditions of the processing chamber or chambers. Tabata does not disclose controlling the ozone gas generating rate based on demand of the processing units. That is, Tabata fails to disclose "a controller configured to determine demand for the ozone-containing gas based on a number of processing chambers processing with the ozone-containing gas, and configured to control the flow regulator to regulate a flow rate of the oxygen-containing gas being supplied to the ozone generator so that a flow rate of the ozone-containing gas being discharged from the ozone generator to be supplied to the processing chamber or chambers substantially corresponds to the ozone-containing gas demand."

Indeed, Applicants note that Figures 2, 3 and 9-12 do not disclose any computer control of the mass flow rate controller 13. This is because the goal of Tabata is to keep the ozone gas

generating rate constant by controlling the pressure of the generator, thereby obviating any need to control the mass flow rate controller 13 during normal operation.

Applicants note paragraphs 0128-0131 and Figure 16 disclose an embodiment with a control circuit 39 that can be employed in other embodiments. However, this embodiment actually emphasizes the above differences between Tabata and the claimed invention. The control circuit 39 is not used to track demand during normal operation, but rather to detect an abnormally low pressure in the ozone generator as a safety precaution.

As explained in paragraph 0130, normal control operation is conducted when the pressure in the ozone generator 31 is within an operation range. In other words, the operation proceeds as discussed above by maintaining a constant ozone gas generating rate without the need for controlling mass flow rate controller 13. Only when there is an abnormal situation – i.e., the generator pressure falls below a certain level – is the control circuit utilized to control the controller 13. When a control circuit is thus used in Tabata, it is to prevent an accident and not in the normal course of operation. Accordingly, Applicants respectfully submit that claim 1 and its dependent claims are not anticipated by Tabata.

Applicants note that the rejection based on Tabata may be overcome in another way as set forth in the Office Action. While Applicants reserve their right to overcome the rejection in this way, it is believed that the distinctions between Tabata and the claimed invention as discussed above are sufficient to overcome the rejection.

US 5,281,295 to Maeda et al. and US 6,019,848 to Frankel et al.

The Examiner rejected claims 1-4, 9 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Maeda in view of Frankel. The rejection is respectfully traversed.

Maeda is directed to a semiconductor fabrication system that supplies equal amounts of a processing gas from one gas supply source. Figure 1 illustrates an ozone generator 10 that generates ozone for processing in devices 27a through 27e. A uniform supply of processing gas is provided even if only a portion of processing devices are employed through the use of exhaust pipes

and needle valves. The exhaust piper and needle valves divert the processing gas from non-utilized devices without affecting the flow rate in other branches (see, e.g., Col. 2, line 48 to Col. 3, line 6). As the Examiner concedes, Maeda fails to disclose the recited controller of claim 1.

The Examiner cites Frankel to make up for this deficiency. Figure 1C of Frankel discloses a CVD apparatus 10 having a vacuum chamber 15. A gas supply panel 80 is connected to gas and liquid supply sources 90 and supplies the gases and liquids to chamber 15 via supply lines. For example, in the case of ozone, the source 90 of the ozone is an ozone generator 115 that is supplied through line 83 into the chamber 15 (see Col. 15, lines 40-46 and Col. 16, lines 36-47). The supply of the ozone is controlled through valve 96 and mass flow controller 100. Frankel discloses that a process gas control subroutine can adjust the flow rates of the gas supply lines as necessary (see Col. 18, lines 40-64).

Applicants respectfully submit that Frankel does not disclose a controller that controls "the oxygen-gas containing gas flow regulator" as the Examiner claims on page 5 of the Office Action. As discussed above, the control of the mass flow controller 100 is downstream of ozone generator 115. There is no disclosure of controlling the flow of oxygen-containing gas *upstream* of the ozone generator.

Indeed, Frankel suggests that the absence of any such control. At Col. 16, lines 44-47, Frankel explains that multiple ozone generators may be provided for multiple ozone sources. Thus, Frankel suggests adding additional ozone generators to handle an increase in demand, rather than increase the generation of ozone produced by a single generator. Accordingly, Applicants respectfully submit that Frankel does not make up for the deficiencies of Maeda and that claim 1 and its dependent claims are patentable over Maeda and Frankel.

US 5,623,868 to Harada et al., US 5,904,170 to Harvey et al., US 6,869,499 to Toshima et al.

The Examiner rejected claims 5-8 under 35 U.S.C. § 103(a) as being unpatentable by the published over Maeda and Frankel in view of Harada, Harvey and/or Toshima. All three were

merely cited for recitations in the dependent claims, and it is believed that they do not make up for the deficiencies of Maeda and Frankel.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

If, for any reason, the Examiner finds the application other than in condition for allowance, Applicants request that the Examiner contact the undersigned attorney at the Los Angeles telephone number (213) 892-5630 to discuss any steps necessary to place the application in condition for allowance.

In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, Applicants petition for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing Docket No. 1993720051.00.

Dated: November 30, 2005

Respectfully submitted,

By _____

Mehran Arjomand
Registration No.: 48,231
MORRISON & FOERSTER LLP
555 West Fifth Street, Suite 3500
Los Angeles, California 90013
(213) 892-5200